FISCAL

GUIDANCE NOTE 2

Assessing the Fiscal Cost of Subsidies and Fiscal Impact of Reform

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WORLD BANK GROUP

ESMAP

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ACKNOWLEDGMENTS

This is the second in the series of 10 guidance notes under the Energy Sector Reform Assessment Framework (ESRAF), an initiative of the Energy Sector Management Assistance Program (ESMAP) of the World Bank. ESRAF proposes a guide to analyzing energy subsidies, the impacts of subsidies and their reforms, and the political context for reform in developing countries.

This guidance note draws on analytical tools that have been developed and are being used in the recent operational work by country economists and fiscal experts in the Macroeconomics and Fiscal Management Global Practice (MFM) of the World Bank. Thanks go out to Chadi Bou Habib, Ibrahim Saeed Chowdhury, Simon Davies, Shireen Mahdi, and Wael Mansour for their valuable comments and inputs to earlier drafts of this note, and to Yameng Wang for diligent analytical support. This note also draws on the presentations that were prepared and delivered by Aart Kraay at the World Bank MFM Forum (2017), which skillfully summarized the literature on fiscal and debt sustainability and fiscal policy as it pertains to developing countries. All errors that remain are the sole responsibility of the author.

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ACRONYMS AND ABBREVIATIONS

DSA	debt sustainability analysis
DSF	Debt Sustainability Framework
ESRAF	Energy Subsidy Reform Assessment Framework
ESMAP	Energy Sector Management Assistance Program
FY	fiscal year
GDP	gross domestic product
IMF	International Monetary Fund
INDC	Intended Nationally Determined Contributions
IPP	independent power producer
LIC	low-income country
LPG	liquefied petroleum gas
MAC	market access countries
MTBF	medium-term budget framework
MTFF	medium-term fiscal framework
P-FRAM	PPP Fiscal Risks Assessment Model
PPP	public-private partnership
REER	real effective exchange rate
RIR	real interest rate
SOE	state-owned enterprise
SPV	special purpose vehicle

1. MOTIVATION

The objective of this guidance note is to outline the ingredients of an assessment of the fiscal impacts of energy subsidies in an economy from the aggregate fiscal perspective of the government. It demonstrates the interrelations between the fiscal balance, its financing, and impact on key debt and fiscal sustainability indictors. As discussed in the Energy Sector Reform Assessment Framework (ESRAF) Guidance Note on the definition of energy subsidies (Guidance Note 1), energy subsidies may be provided through various channels on the production and consumption sides, and may generate contingent liabilities—explicit or implicit—for a government that must be monitored and managed as part of overall macroeconomic management.

ESRAF defines an energy subsidy as a deliberate policy action by the government that specifically targets electricity, fuels, or district heating and that reduces the net cost of energy purchased, reduces the cost of energy production or delivery, increases the revenues retained by energy suppliers, or has any combination of these three effects. ESRAF also covers non-energy use of oil, gas, and coal, such as natural gas used as a feedstock for fertilizer manufacture and naphtha and liquefied petroleum gas (LPG) used as feedstocks in petrochemicals. Subsidies are not always paid for by the government. Consumers may subsidize producers, producers may subsidize consumers, and financiers and other actors not linked to energy consumption or production, including those outside the country, may be covering the costs of subsidies.

This note focuses on the costs of subsidies to the government. One important form of subsidies consists of direct budgetary transfers from the government to either consumers or producers, which are recorded in the government public sector budget. For instance, with the justification of social benefits, governments often establish consumer prices for energy that are below reference prices (prices that would have prevailed in a competitive market, or the cost of efficient production if a competitive market does not exist), and then compensate the energy suppliers for the difference (also referred to as the price gap) between the reference prices and the government-controlled prices.[1] Another subsidy delivery mechanism is provision of the subsidy benefits directly to end-users, typically households. In addition, a government may provide subsidies in the form of tax exemptions to energy service providers, tax credits for investment, or allowing the energy-related public utilities and national oil companies to run arrears on their debt service and other payment obligations to the government.

The global financial crisis of 2008–09 demonstrated how countries, whether net energy exporters or importers, had to adopt countercyclical fiscal policies that eroded their fiscal buffers, which caused them to face situations of increased macroeconomic vulnerability and threats to their debt sustainability. As fiscal deficits rose, policy makers were facing calls to protect their existing poverty reduction initiatives and existing subsidy schemes. In some countries, there were political pressures to increase energy subsidies to protect households and strategic investments or firms from these mounting macroeconomic shocks. While

many governments have embarked on subsidy reforms, substantial subsidies still remain. Such is the case in a significant part of the Middle East. Meanwhile, a key ingredient for arriving at a market-based solution to the climate change challenge is by removing subsidies on fossil fuels and reflecting the economic, social, and environmental costs of carbon-intensive activities in their prices.[2] Fossil fuel reforms have been explicitly integrated into the climate change policy packages outlined in their Intended Nationally Determined Contributions (INDCs) in 13 countries under the 2015 Paris Agreement.[3] Assessing the fiscal impacts of energy subsidy reforms (in fossil fuels, including electricity and district heating relying on them) from the macroeconomic context is, therefore, an essential prerequisite for beginning to implement fossil fuel subsidy reforms.

2. TYPICAL QUESTIONS TO ADDRESS

When assessing the fiscal impact of energy subsidy reforms from the macroeconomic perspective, policy makers typically grapple with the following questions:

- How important is the energy sector-related public spending in the macroeconomic context of the country? This includes looking at not only direct subsidy programs that one sees as a line item in a government's budget, but also subsidies on the production side, and any sovereign guarantees and concession arrangements accorded to the private sector.
- How much revenue is the government losing due to energy subsidies? Examples include fiscal concessions provided to energy suppliers, lower dividends transferred by state-owned energy suppliers and lower corporate income taxes paid by all energy suppliers to compensate for the financial losses from consumer price subsidies that are not reimbursed by the government, and underpricing of goods and services provided by the government to energy suppliers.
- Does the medium-term fiscal framework (MTFF) of the government incorporate the fiscal and budgetary implications of the government's energy subsidies and their reforms? This includes assessing the fiscal and debt trajectories during the phasing out of energy subsidies, and the impact of energy price adjustments on the fiscal situation of the government during the transition to fully market-based energy pricing mechanisms. What is the fiscal impact of alternative transition paths to energy subsidy reforms, and what are their implications for debt dynamics?
- How much fiscal space does the government have to finance the transition period in the energy subsidy reform program, and is there sufficient room for provision of adequate mitigation measures while maintaining fiscal sustainability?
- Where there are consumer price subsidies, given volatile fuel prices, which energy subsidy poses the largest risk to fiscal sustainability in a country, fixed price, indexed price, or fixed nominal subsidy?

- Are fiscal impacts from uncertainty (especially from exchange rate, commodity price, and interest rate fluctuations) and fiscal risks from the government's contingent liabilities being incorporated in fiscal sustainability when making informed fiscal policy decisions for the implementation of the energy subsidy reforms in the country?
- What are the fiscal costs of eliminating fossil fuel subsidies and supporting renewable energy and adoption of green technologies in a fiscally sustainable manner? These reforms will accompany a country's climate change mitigation efforts as indicated in their respective voluntary INDCs that they pledged under the 2015 Paris Agreement.

3. CONCEPTUAL FRAMEWORK

Removing energy subsidies in a country, if appropriately implemented, will typically take a few years to undertake. Where subsidies take the form of consumer support borne by energy suppliers, government revenue from the suppliers may increase after the subsidy reforms. If the subsidies include consumer price subsidies, prices of goods and services that use energy to produce and deliver it usually rise during the transition period and thereafter. This includes prices of goods and services in the consumption basket of the poor, such as food and public passenger transportation services. Depending on which form of energy is being subsidized, poor and vulnerable groups might not be receiving subsidies directly from the government before the energy subsidy reforms—the poor, especially in low- and lower-middle-income countries, do not own motorized vehicles or backup power generators and therefore do not purchase gasoline or diesel, and many are also not connected to grid electricity—but after the energy subsidy reforms will need to be provided with appropriately targeted social protection to compensate them for indirect effects of higher energy prices (see Note 3 for quantification of the impact of these indirect effects on the poor). These reforms will also affect future fiscal deficits and associated public sector financing requirements which, in turn, will affect a country's gross debt and the affordability of the government's overall public spending needs in the medium term.

The existing methodologies for assessing fiscal sustainability can be summarized in three main approaches: *accounting, analytical,* and *empirical.*

The accounting approach uses identities involving government revenues, expenditures, deficits, public debt levels, economic growth rates, and interest rates. Then it projects debt and debt ratios going forward, and identifies the forces driving the debt dynamics (debt dynamics decomposition). The assessment is based on the level and growth of projected debt. Intuitively, debt sustainability implies that the accumulation of public debt is not excessive, and this translates into saying that the public debt is not growing "too fast" or that the level of public debt is not "too high." For each scenario that we want to explore, we can compute the corresponding debt projection and debt dynamics decomposition.

The *analytical* approach goes further and establishes a formal condition of *solvency*, for example:

- The achievement of a stable ratio of debt to gross domestic product (GDP).
- The intertemporal budget constraint.
- The achievement of an acceptable target for the debt-to-GDP ratio (such as the Maastricht 60% value).

This has the advantage that the solvency condition gives a well-defined meaning to the vague expressions "too fast" and "too high." Furthermore, the approach intends to answer such policy questions as *What should the government do to restore sustainability?* By comparing the projected debt in the baseline scenario with the arbitrarily chosen debt path that satisfies the solvency condition, one can derive the fiscal adjustment needed to fill the gap between the two debt paths. If such a fiscal adjustment policy were to be implemented, one would be able to restore sustainability—that is, the new public debt projection (incorporating the change in fiscal policies into the baseline) would meet the solvency condition. For the solvency conditions mentioned before, the standard indicators would be, respectively, the following:

- The debt-stabilizing primary balance.
- The permanent adjustment in the structural primary balance projected over a finite time horizon.

The *debt-stabilizing primary balance* is widely used in practice,for example, the indicator S2 used by the European Commission. This indicator measures the permanent adjustment in the structural primary balance projected over an infinite time horizon—that is, very far into the future—that would be needed for the debt-to-GDP ratio to satisfy the intertemporal budget constraint).

Similarly, the indicator S1 also used by the European Commission measures *the permanent adjustment in the structural primary balance projected over a finite time horizon* that would be needed for the debt-to-GDP ratio to reach a 60% value at the end of that horizon. One can compute these indicators not only for the baseline scenario, but also for the alternative ones.

The fundamental building block of fiscal sustainability analysis is the public sector or *government budget constraint* (identity):

Change in debt = interest payments – primary balance – seigniorage + GDP growth effect + inflation effect on domestic debt + foreign exchange revaluation effect

The standard debt accumulation equation as share of GDP Y_t, with lowercase letters denoting shares of gross domestic product (GDP), that is, $x_t \equiv X_t / Y_t$, is as follows:

$$\frac{D_t}{Y_t} = (1+i_t)\frac{Y_{t-1}}{Y_t}\frac{D_{t-1}}{Y_{t-1}} - \frac{B_t}{Y_t} = \frac{(1+i_t)}{(1+\pi_t)(1+g_t)}\frac{D_{t-1}}{Y_{t-1}} - \frac{B_t}{Y_t}$$

$$d_t = \frac{(1+r_t)}{(1+g_t)}d_{t-1} - b_t$$

Where $1+g_t = \frac{Y_t/P_t}{Y_{t-1}/P_{t-1}}$ is (gross) real GDP growth rate.

- D_t is domestic currency–denominated nominal debt;
- i_t is (gross) nominal interest rate;
- π_t is the domestic inflation rate;
- B_t is primary balance (that is, excluding debt service); and
- B_t–$i_t D_{t-1}$ is overall balance (that is, including debt service).

This equation is the basis for analyzing *debt dynamics*[4]

If the drivers of future debt dynamics (real interest rate r_t, real growth rate g_t, and primary balance as share of GDP b_t) are uncertain, there is the need for *stochastic* fiscal sustainability analysis rather than *deterministic* debt sustainability analysis (DSA). If the drivers are endogenous, there is the need for empirical evidence on interactions between drivers of debt dynamics (that is, fiscal policy and growth), as well as theory-based simulations of alternative paths. Fiscal sustainability is more than just whether present value condition holds. The Debt Sustainability Assessment Framework (DSF) of the World Bank and the International Monetary Fund (IMF) for low-income countries (LICs) and DSA for market-access countries (MAC-DSA) can be used for this purpose. These have been designed on the basis of rich empirical evidence on debt indicators and debt sustainability. The World Bank and the IMF are currently revising the LIC-DSF jointly, while the MAC-DSF will be reviewed later in 2018..

The *empirical* approach uses empirical evidence to estimate critical *threshold* values for the debt burden indicators that, if crossed, would imply an increasing probability of the government falling into a debt distress situation (for example, arrears, serious problems to rollover maturing debt, and defaults). Estimations are usually based on the experiences of national governments undergoing debt distress with their specific circumstances related to macroeconomic developments, indebtedness, fiscal policies, and institutional and political conditions.

This approach is very useful to monitor ex ante the risk of debt distress going forward, given the current circumstances and developments. The World Bank-IMF DSF, for instance, relies on the *empirical* approach to determine thresholds for external debt (controlling for indicators of institutional quality) and to classify countries according to their level of risk of debt distress. In this context, several studies report public debt thresholds around 80–90% of GDP, which would draw the line between the growth-enhancing and growth-hampering effects of public debt.

Reinhart and Rogoff (2010) analyze 44 industrial and developing economies over two centuries and find that the GDP growth rate for countries whose debt exceeds 90% of GDP is lower than that for low-debt countries. Kumar and Woo (2010) focus on 38 industrial and emerging economies in 1970–2007, and also conclude that the debt threshold is around 90% of GDP. Caner, Grennes, and Köhler-Geib (2010) find a lower threshold at 77% of GDP based on the period 1980–2008.

Samples and statistical techniques differ across studies, implying robustness of the conclusion that public debt thresholds are fairly high as a share of GDP. Studies also report little correlation, if any, between growth and debt for low-debt countries, thus implying that, provided the thresholds are not breached

and adequate institutions are in place, debt financing can safely be used to spur investment and growth.

Any energy subsidy program that was initially designed and implemented with a view toward stabilizing energy prices for consumers and producers will depend on the government's fiscal capacity to absorb fluctuations in energy prices at each stage in the supply chain down to consumption. It needs to be considered in the context of budget allocation tradeoffs, tax policies, and public sector borrowing requirements.

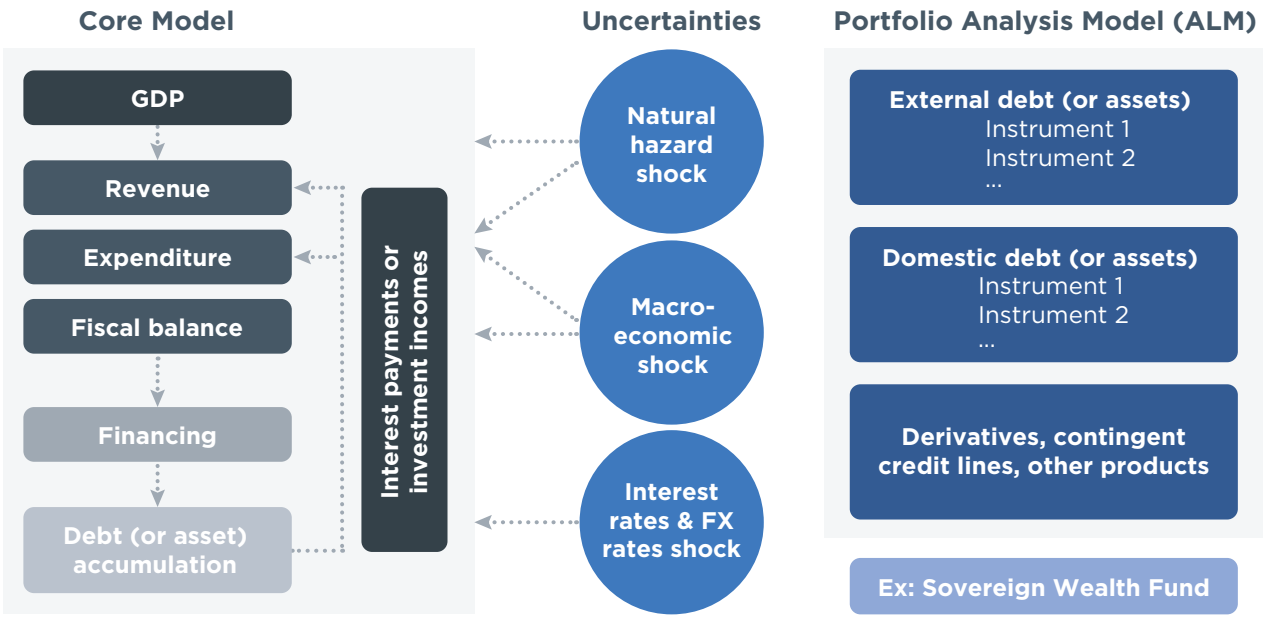
An integrated MTFF is needed to assess the revenue and expenditure impact of energy subsidy removal over time. This is a unified analytical framework that brings together the most salient outcomes of the institutions and polices governing budget, financing, intergovernmental fiscal system, and asset-liability management in a country. It provides a basis for assessing the performance of the economy and the public finances at an aggregate level. As a result, it integrates the fiscal situation and prospects of different regions or tiers of government within the country that will be influenced by the fiscal effects of subsidy removal. This impact will be positive—in terms of the fiscal resources saved from the energy subsidies previously being provided to firms and households that are removed as well as additional government revenue from energy suppliers previously suffering financial losses created by consumer price subsidies not reimbursed by the government—and negative—in terms of the increase in fiscal resources needed to support additional social protection programs that may need to be put in place to compensate for the increase in costs and retail prices of essential products and services that use energy to produce and deliver and are consumed by the poor and vulnerable groups (or any others the government wishes to compensate as a result of the energy subsidy removal in the interim). Using an integrated fiscal framework will help to quantify the fiscal resource envelope and plan the resource allocation among competing spending programs.

The foundation of the MTFF is the intertemporal budget constraint of the government. The MTFF is a basis for discussing economic outlook and analyzing fiscal policy options. It helps make decisions on tax reform, revenue-sharing agreements, expenditure planning and rationalization, fiscal rules, borrowing framework, debt contracting, and restructuring. The MTFF goes beyond published fiscal accounts concerning horizon and scope, and deals with aggregate items and generates multiyear projections of key debt, macroeconomic, and fiscal indicators to assess the implications of the economic cycle, medium-term planning, structural changes, price and debt dynamics. This includes examining disaggregated budget items, such as energy subsidies, contingent liabilities, as well as hidden liabilities (undertaken using off-budget vehicles and quasi-fiscal operations of subnational governments to rescue local SOEs), potential sources of debt, and spending obligations and their aggregate medium-term fiscal impact. At the subnational level, an MTFF involves a set of projections consistent with the specificities of the subnational economy and public finance institutions. Figures 1–3 show the interactions among economic and fiscal variables and the data needed to estimate fiscal impacts under the baseline outlook and alternative scenarios. In doing so, the MTFF can help determine the total amount of resources available and allocation of these resources across spending agencies.

FIGURE 1: Macroeconomic Linkages between Public Spending, Taxes, Financing, and Debt

Macro	**Economic activity**	Nominal and real GDP, activity indicators, prices of goods and assets. Tax bases.
Budget Operating & Capital Budget	**Revenues** (current & capital)	Personal income tax, corporate income tax, property tax, taxes and charges (excl. property tax), general subvention, subsidies and funds for current purposes, other current revenues. Sales of assets, subsidies and funds for current purposes, other property revenues.
	Expenditures (current & capital)	Salaries, guarantees and sureties, interests, other current expenditures (excl. salaries, guarantees and sureties, and interest). Property expenditure.
Financing Cash Flows	**Sources of funds**	Primary balance, borrowings, use of financial assets (e.g., use of budget surpluses from previous years use of unallocated funds, other use of assets and other revenues not related to debt).
	Uses of funds	Debt service (principal amortization and interest from existing and new debts), other financing needs.
	Indicators (Fiscal Responsibility Law)	a. Debt (% of revenue) b. Debt service plus guarantees and sureties (% of revenue). c. Current revenues plus property revenue (excl. subsidies/funds) minus current expenditure (% of revenue). d. 3-year average of indicator.
Debt Existing and New Debts	**Existing debts** (incurred in the past)	Debt stock and debt service (principal amortization and interest). Forecasts debt-by-debt.
	New debts (to be incurred in the projection horizon)	Borrowing, debt stock and debt service (principal amortization and interest). Forecasts debt-by-debt.

FIGURE 2: Elements of a Fiscal Framework

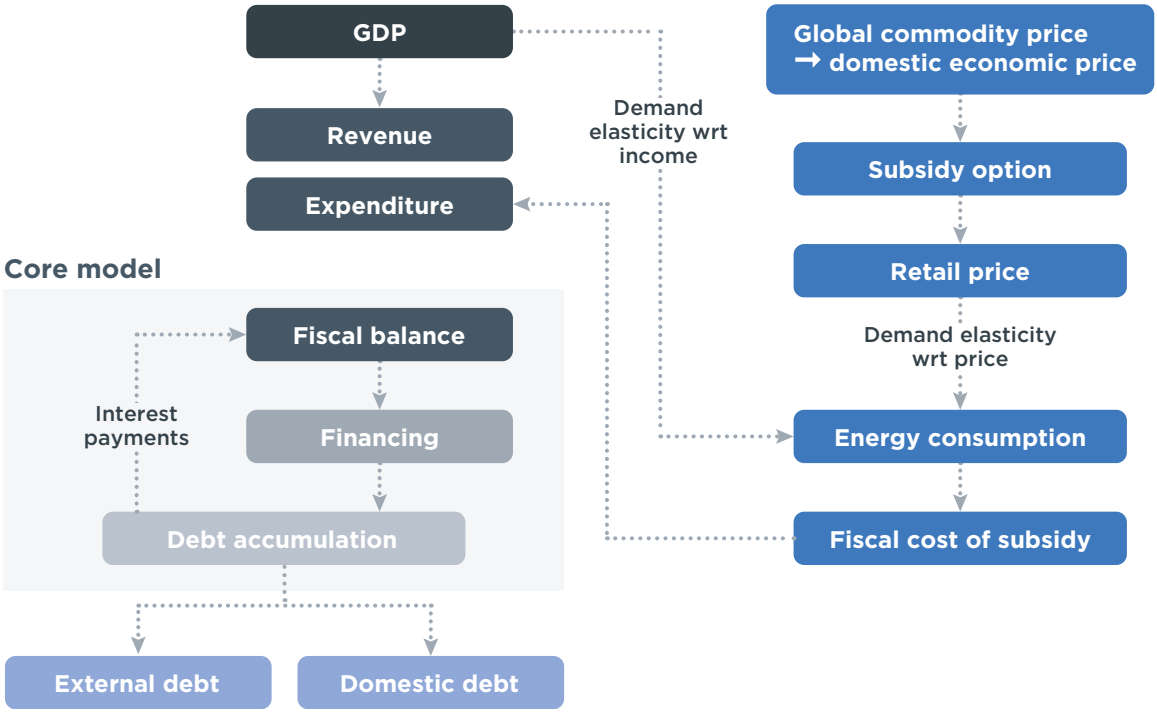


Note: FX = foreign exchange; ALM = asset liability management.

The MTFF has the ability to generate fiscal forecasts, typically multiyear projections (say 3, 5, or 10 years), to inform medium-term planning. It helps assess the impact of economic fluctuations, price dynamics, structural changes in the economy and institutions, contingent liabilities, potential sources of spending obligations in the future, and investment and operational and maintenance costs, and highlights interactions among economic and fiscal variables. One needs to undertake scenario analyses and stress tests. This starts with a view by the analyst of the baseline macroeconomic outlook and alternative scenarios that account for alternative macroeconomic shocks and policy options the government may be considering to accompany the energy sector reforms. This includes policy decisions on tax reform, revenue-sharing agreements, expenditure planning and rationalization, fiscal rules, framework for asset-liability management, and its borrowing policies (domestic and external). To this end, the MTFF helps assess the stability (smoothness) of fiscal outcomes and the underlying fiscal position of government over time. It also informs the government about the sustainability of fiscal and financing policies, given the financial viability of projected expenditure programs and/or debt accumulation, and examines whether the reform trajectory is robust to shocks.

In countries with material dependence on oil revenue for the government's budget, for instance, if there is a risk that international oil prices will remain below the highs recorded in 2014 and earlier, the application of a medium-term fiscal framework (MTFF) would be especially timely in order to assess the need to raise non-oil revenues, to reduce and gradually eliminate subsidies, adjust other public expenditures, and in general to flag when the spending on key expenditures

FIGURE 3: Adding Subsidies to the Core Integrated Fiscal Framework



Note: wrt = with respect to

is slipping. An MTFF helps to ensure fiscal discipline by making more apparent the impact of current policies on the government balance in the coming years. Likewise, the existence of an MTFF may facilitate monitoring by providing benchmarks, against which budgetary developments can be assessed over time and there is alignment with the country's development strategy and policy priorities. Overall, a well-designed MTFF should reflect the impact of past budgetary commitments, as well as the future cost of new policy measures. The strengthening of the MTFFs can efficiently complement the introduction of other institutional reforms, such as the introduction of an expenditure rule or top-down budgeting. Fiscal policy decisions, such as the fuel taxation regime that accompanies the energy price adjustment mechanism (as in Mexico's energy subsidy reforms in 2017), can affect the pace and magnitude of any decline in subsidy costs or increase in government revenue as part of an energy subsidy reform program in a country.

Energy subsidy reforms in Indonesia and Mexico were triggered by a combination of declining production of fossil fuels, rising demand, exchange rate devaluation, and large fluctuations in fuel prices. Being major oil and gas producers, both countries were especially affected by price volatility, as well as the effects of exchange rate fluctuations on the size of energy subsidies. This resulted in increasingly unsustainable subsidy budgets and the realization among policy makers that phasing out subsidies would increase fiscal space. Since 2014, Indonesia successfully reduced fossil fuel subsidies from 3.1% of GDP in 2014 to just 1% in 2016. This sharp drop reflects the falling oil prices since 2014 and the government's policy aim of removing gasoline subsidies and limiting diesel subsidies, and replacing the kerosene price subsidy with the LPG subsidy by gradually taking subsidized kerosene out of the market. Mexico's gasoline and diesel subsidy reforms were outlined in the 2014 Hydrocarbon Law and are currently underway with its announced gradual price adjustment mechanism (IEA 2016).

The Arab Republic of Egypt is another country where the government in 2014 committed to an ambitious plan to achieve large reductions in energy subsidies. Following four annual electricity price reforms and three fuel price increases, energy subsidies fell steeply from 6.5% of GDP in fiscal year (FY) 2014 (July to June) to 3% in FY2016 (see box 1), which in turn generated important savings that helped shift the government budget toward social sectors.

BOX 1: PUTTING EGYPT'S ENERGY PRICE REFORMS IN A MACROECONOMIC-FISCAL CONTEXT

The government in 2014 committed to an ambitious plan to eliminate energy subsidies, which needed a mid-course correction because of changes in the macroeconomic framework. The goal was to progressively drive energy subsidies down to a target of 0.5% of GDP by FY2019, leaving only limited support for LPG and electricity to benefit low-income consumers. Between July 2014 and July 2017, the government implemented four annual electricity price reforms and three fuel price increases (box table 1.1). As a result, energy subsidies fell steeply from 6.5% of GDP in FY2014 to 3% in FY2016. Subsidies were set to fall further to 2.5% of GDP in FY2017, but the substantial depreciation of the Egyptian pound and

box continues next page

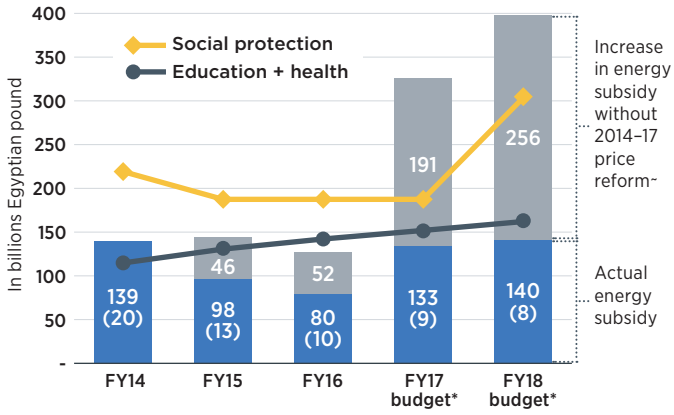
resulting increases in the cost of energy production meant that subsidies instead rose toward 3.9% of GDP in FY2017. Given macroeconomic challenges, the cabinet has approved the deferral of the cost recovery target for electricity until FY2022. Energy subsidies are now projected to decline to 3.2% of GDP in FY2018 and 1.4% in FY2019, continuing downward thereafter, thanks to the planned tariff adjustment. Also, in the absence of any energy price reforms since 2014, it is conservatively estimated that subsidies would have been higher by EGP 256 billion in FY2018, raising the energy subsidy bill to 8.9% of GDP.

Electricity tariffs in FY2018 are already higher than had originally been targeted for FY2019, according to original plans of FY2014, demonstrating government commitment to energy subsidy reform. The commitment to containing energy subsidy is also shown in the shift of the government's approach to energy price setting. Starting in 2016, instead of announcing a trajectory for electricity prices, the government committed to a subsidy target in its MTFF agreed with the IMF, and will adjust prices annually to meet this target. Going forward, the petroleum sector has committed to applying automatic fuel price indexation to reduce the impact of external factors on the subsidy target.

BOX TABLE 1.1: Energy Price Increases

	Year-on-year changes (percent)				Cumulative changes (%)	Cost recovery (%) by FY2017/18
	2014	2015	2016	2017		
Diesel	64	0	31	55	232	64
Gasoline 80	78	0	47	55	306	73
Gasoline 92	41	0	35	43	170	67
Gasoline 95	7	0	0	6	14	89
LPG	0	0	88	100	275	35
Automotive natural gas	144	0	45	25	344	83
Electricity	31	19	33	40	190	79

BOX FIGURE 1.1: Budgeted Health, Education, Social Protection, and Energy Subsidy Spending



~World Bank estimate. *MoF budget of energy subsidy.
Note: Numbers in parentheses are in billion U.S. dollars.

Consistent energy price adjustments have yielded important savings that helped shift the government budget toward social sectors. Prior to reform, energy subsidies exceeded the budget for education, health, and infrastructure combined, and were almost three times the budget for government investment. Price reforms have generated savings that contributed to reducing fiscal deficit while allowing for additional government expenditure on education, health, and social protection. Government spending on health and education outstripped spending on energy subsidies for the first time in FY2015 (see box figure 1.1) and has continued to do so. At the same time, spending on social protection is budgeted to almost double in FY2018, as an explicit measure to mitigate the negative social impact of depreciation and energy price increases.

Financial risks for government and its state-owned enterprises (SOEs) (such as power utilities and national oil companies) from fluctuations in exchange rates and interest rates (domestic or external) will pose vulnerabilities and may require budget support. High levels of SOE debt pose risks to fiscal sustainability and stability. One can also examine if the expected current expenditures by the government (given by existing policies and trends) are adequate to fund the needed services in health and social assistance. Otherwise an even larger budgetary savings must be achieved in ensuing years. The implicit social contract—reflecting political concerns about "fair share of sacrifices"—requires increasing tax collection and reducing selected expenditures (such as energy subsidies going to the rich), and its fiscal tradeoffs can be well illustrated using such a country-specific MTFF.

Fiscal sustainability of energy subsidies and links to debt sustainability and medium-term budget-fiscal framework. The MTFF assesses whether public resources available to finance infrastructure and social spending and promote economic development are affordable over the medium term at an aggregate level and helps the authorities monitor compliance with fiscal rules and spending targets. DSA assesses the financial viability of debt-financed budget deficits. It monitors compliance with public debt rules and targets for debt and borrowing (see box 2).

Assessing sustainability, in simple terms, requires one to form a view about how outstanding stocks of liabilities are likely to evolve over time. These, in turn, depend on macroeconomic and financial market developments that are, by their very nature, uncertain and variable (for example, the costs of rolling over debt). It also depends on taking a country-specific view about how much fiscal adjustment is politically and socially feasible in the near term (that is, how much primary surplus can be realistically observed in any given year).

BOX 2: FISCAL SPACE, FISCAL SUSTAINABILITY, AND SOLVENCY ASSESSMENTS REQUIRE SCENARIO ANALYSES AND STRESS TESTING

Fiscal Space

World Bank *Global Economic Prospects* (2015) states that fiscal space "is the availability of budgetary resources for a specific purpose . . . without jeopardizing the sustainability of the government's financial position or the sustainability of the economy."

The IMF Staff Paper "Assessing Fiscal Space" (2016) states that *fiscal space* "in general refers to room for undertaking discretionary fiscal policy relative to existing plans without undermining fiscal sustainability."

Assessment of *fiscal sustainability* requires not just knowing whether fundamental solvency condition holds. Knowledge of likely future paths of debt in baseline and alternative scenarios is also needed, as well as stories around the likely macroeconomic consequences of those paths. Solvency requires the present value of real future primary balances to be equal to the current level of real debt.

Examples of typical scenario analyses and stress tests in an MTFF are provided below.

box continues next page

Baseline Scenario

- Outlook deemed more likely to happen.
- Current legislation versus current policies (no policy change).

Alternative Scenarios and Fiscal Risk

- Slowdowns in economy-wide growth, income, and employment lead to revenue decline and spending increase (*automatic stabilizers*).
- Fluctuations in commodity prices imply risks for revenue base.
- Slow tariff adjustments in SOEs imply revenue decline and potential pressures for higher budget subsidies.
- Rising prices (such as oil and commodities) may increase budget-funded subsidies and operating costs.
- Wages and pension liabilities (age-related spending) may rise.
- Natural disasters pose reconstruction and recovery costs (earthquake, droughts, floods, climate change).
- Increases in cost of borrowing lead to higher debt servicing costs.
- Incorrect modeling, optimism in forecast of revenue, and lower anticipated spending items in an MTFF may imply that the exogenous parameters and projections might not be accurate (*model uncertainty*).

Debt sustainability also depends on the behavior of the balance sheets and revenue-expenditure balances of several different parts of the economy—the government, the banking system, and the corporate and household sectors—which are linked with one another by actual and contingent liabilities. Incorporating these factors, though theoretically desirable, may be practically difficult, given the availability of consistent and reliable information. Hence, a significant investment must be made in putting in place monitoring and reporting systems that compile these data on a regular basis in order for it to be used for assessing sustainability. Table 1 shows a hypothetical example of the kind of country-specific information that is needed in this regard.

FISCAL SUSTAINABILITY UNDER UNCERTAINTY

Fiscal sustainability under uncertainty addresses volatility and uncertainty surrounding fuel prices and GDP growth. The stochastic DSA incorporates past co-movements in key macroeconomic variables in a country-specific manner. These variables will affect the amount of energy subsidies that a government may have to provide in any given year due to fluctuations in oil and commodity prices, real effective exchange rates (REERs), real interest rates, or output growth in the economy. This analytical approach helps to set out a probabilistic path of government debt and allows for comparison of the impacts of realization of various contingent liabilities versus reform scenarios in a world with uncertainty.[5] There is an important qualification, however. This approach is helpful where the government is not materially dependent on oil and gas revenue. Otherwise, the complexity of calculating fiscal revenue from oil and gas may make it impractical to capture stochastic elements on the revenue side.

TABLE 1: Hypothetical Example—Elements of a Fiscal Framework Model

			Year			
			t	t+1	...	T
Economic activity	GDP (nominal)	million LCU				
	GDP (nominal) growth rate	%				
	Real GDP growth rate	%				
	GDP deflator growth rate	%				
	CPI Inflation	%				
Exchange rates	GBP	LCU per unit of BAM				
	EUR	LCU per unit of EUR				
	USD	LCU per unit of USD				
Revenue	Revenue	million LCU				
	Taxes	million LCU				
	Social security contributions	million LCU				
	Grants	million LCU				
	Other revenue	million LCU				
Primary expenditure	Primary (non-interest) expenditure	million LCU				
	Wages and salaries	million LCU				
	Social contributions	million LCU				
	Subsidies	million LCU				
	to public corporations	million LCU				
	to private enterprises	million LCU				
	Grants	million LCU				
	Social benefits	million LCU				
	Other expense	million LCU				
	Net acquisition of nonfinancial assets	million LCU				
Interest expenditure	Interest payments	million LCU				
Total expenditure	Total expenditure	million LCU				
Primary fiscal balance	Primary fiscal balance	million LCU				
Overall fiscal balance	Overall fiscal balance	million LCU				
Cyclically adjusted	Cyclically adjusted primary balance	million LCU				
	Cyclically adjusted overall balance	million LCU				

Looking at the same conceptual framework, recall the basic debt accumulation equation (Kraay 2017),

$$d_t = \frac{(1 + r_t)}{(1 + g_t)} d_{t-1} - b_t$$

We then define vector of uncertain future drivers of debt $Z_t = (r_t, g_t, b_t)'$

For a given initial debt ratio d_0, the uncertain future path of d_t depends on the uncertain future path of Z_t:

$$\{Z_t\}_{t=1}^{t=T} \rightarrow \{d_t\}_{t=1}^{t=T}$$

We then use econometric model of dynamics of drivers of debt in Z_t to simulate $\{Z_t\}_{t=1}^{t=T}$, for example, panel vector autoregression estimates in Hevia (2012) or undertaking Monte Carlo Simulations on the correlated variables.

$$Z_t = \mu + \sum_{j=1}^{p} B_j Z_{t-j} + \sum_{j=1}^{q} \Gamma_j X_{t-j} + \varepsilon_t$$

We also estimate the parameters μ, B_j, Γ_j. Because the exercise is purely predictive, identification of causal effects is not required.

X_t is vector of exogenous global variables (for example, world growth, terms of trade, and oil prices) that affect debt drivers in Z_t

$$X_t = \beta + \sum_{j=1}^{p} \phi_j X_{t-j} + u_t$$

where β and ϕ_j are more parameters to be estimated.

An example of this approach is a stochastic fiscal sustainability model based on a spreadsheet developed by the World Bank that can generate scenarios and stress tests under uncertainty for a wide range of circumstances, including to assess the fiscal impact of energy subsidy reforms, as well as fiscal impact of public-private partnerships (PPPs), sovereign guarantees on energy projects, concession arrangements entered into by energy utility with private partners, and natural disasters in a country. It addresses volatility and uncertainty surrounding oil prices and GDP growth. This analytical tool incorporates past co-movements in oil and commodity prices, the REER, real interest rate (RIR), and output growth. This approach helps to set out a probabilistic path of government debt and allows for comparison of realizations of various contingent liabilities versus reform scenarios in a world with uncertainty. "Fan charts" and cumulative probability distributions allow the analyst to simulate the impacts of these shocks with key fiscal and debt sustainability-related variables.

4. WHY DO FISCAL RISKS MATTER IN THE ENERGY SECTOR?

Contingent liabilities pose fiscal risks that need to be identified and managed as well. There are potential future subsidies, beyond those currently being financed by the government, that need to be identified and quantified in order to get a fuller picture of the fiscal costs and macroeconomic vulnerabilities that the energy sector poses in a country. If state-owned energy firms are making large losses and considered too big or too important to fail, if operational inefficiencies in the sector lead to mounting debts by all energy firms and threaten the delivery of essential energy services, or if currency depreciation makes

it impossible for energy firms to pay back foreign debts when their revenues are in local currency, the government may eventually have to step in and rescue the firms.

Similarly, unpredictable weather conditions in countries that depend on hydropower or natural disasters that impact energy availability and prices will pose fiscal risks for a government. In countries with a large share of hydropower in the power mix, such as in east Africa, droughts pose a considerable financial challenge: hydropower is often the least-cost source of electricity, whereas emergency diesel generation to make up for lost hydropower is the most expensive, and yet raising electricity tariffs to capture the sudden increase in the cost of power generation is seldom, if ever, politically feasible. In the absence of very high power tariff increases, the price gap grows, as do contingent liabilities for the government. This makes it imperative to look for ways to improve the government's fiscal position over the medium term, while at the same time bearing some of the fiscal costs of energy subsidy reforms in the transition period to fully market-determined pricing mechanisms for energy. New infrastructure investments using innovative PPPs may also create claims on future public resources, calling for a careful assessment of associated fiscal risks and for contingency planning by the fiscal authorities in a government.

Going beyond estimating aggregate fiscal risks to pointing out the specific sources of such risks and what can be done about them is important. This requires deep sector or utility knowledge and collaborative efforts among specialists with different areas of expertise. For example, several recent country-specific studies have aimed to link fiscal risks, investment in energy, consumer tariffs, and economic performance (Mansour and others 2016). Sectoral models in the Comoros, Kosovo, and Lebanon allowed policy makers to understand better the implications of policy decisions on these key variables. In all cases, the models developed responded to country-specific context and policy questions. In the Comoros case, the questions were the following:

- *What are the subsidy needs, and will ongoing reforms narrow the utility's financing gap, thereby reducing fiscal risk?*

In the Kosovo case, the questions were the following:

- *How do investment and subsidy choices impact required power imports, exports, and consumer tariffs, and what are the likely fiscal impacts of these choices?*

In the Lebanon case, the question was as follows:

- *What is the expected economic loss in terms of growth resulting from the deficiency of the electricity sector?*

5. HOW DO WE ASSESS THE FISCAL IMPACTS OF THE FISCAL RISKS?

Fiscal risks need to be assessed as part of a multi-dimensional effort and will require a look at both sides of a government's balance sheet. A convenient analytical approach that can be used to identify and catalogue the various sources of fiscal risks for the government from energy sector subsidies is using the government's balance sheet.

Theoretical foundations can explain the realization of contingent liabilities by modifying the domestic debt accumulation equation to reflect risk that government may assume additional liabilities $l_t = L_t/Y_t$ with probability p_t, such that

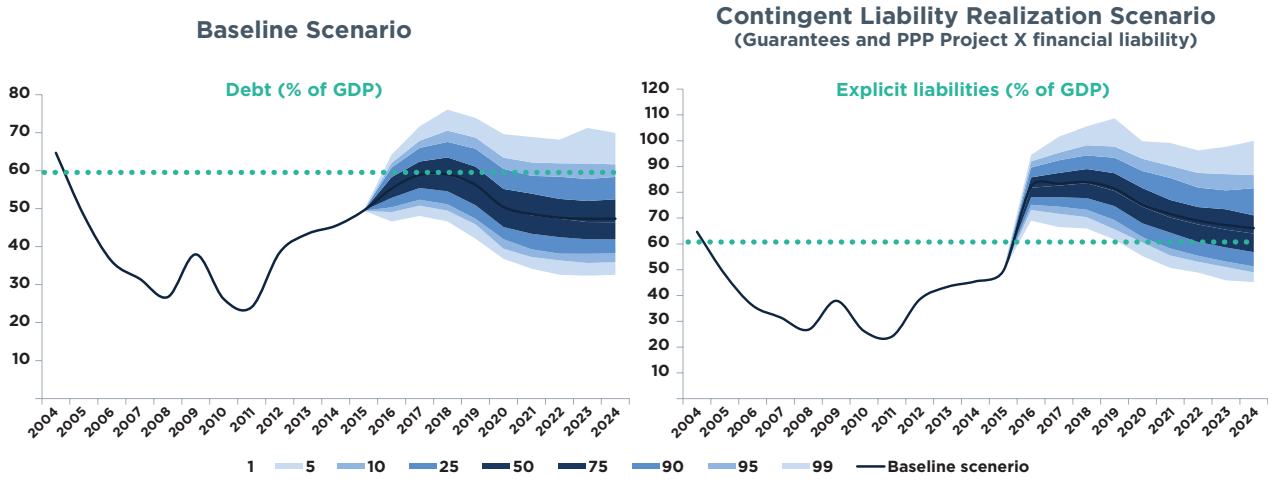
$$d_t = \begin{cases} \frac{(1+r_t)}{(1+g_t)} d_{t-1} - b_t, \text{ with probability } 1 - p_t \\ \frac{(1+r_t)}{(1+g_t)} d_{t-1} - b_t + l_t, \text{ with probability } p_t \end{cases}$$

Figure 4 shows that either the contingent fiscal risk materializes (right panel) or it does not (left panel), and the debt accumulation equation holds in both states of the world.

In practice, to understand how important the contingent liabilities that can arise from energy subsidies (as opposed the subsidies currently financed by the government) may be in the overall fiscal situation of the government, the first step is to look at both sides of the government balance sheet. This fiscal analysis needs to cover the entire portfolio of direct (defined below) and contingent liabilities, as well as assets, and the revenue base. This, in turn, requires that the government identify, classify, and assess its fiscal risks so that it can regularly generate reliable estimates of future payments that may result from its past and pending liabilities. Informational, political, and institutional challenges need to be overcome in this regard, for which an active role of senior policy makers in the government is critical.

On the liabilities side, this implies estimating the *fiscal risks matrix* (see Table 2). This delineates the liabilities of the government in terms of a two-by-two matrix. Liabilities can be categorized as *direct* or *contingent*,

FIGURE 4: Realization of Contingent Liabilities under Uncertainty



and simultaneously, whether they are *explicit* or *implicit*.

Direct liabilities of a government are the legal and contractual obligations that the government will have to honor in any event. Typical direct liabilities of a government include government debt and expenditures as stated in the budget act each year, but they also include non-discretionary long-term expenditure obligations of the government, such as the civil service wage bill, pension, and future recurrent cost of public investment projects and fully or partially rescued parastatals. If there are any long-term purchase agreements based on law and contracts, they are also part of government direct liabilities. Such long-term obligations often involve the private sector. Typical examples of such obligations are power purchase agreements with independent power producers (IPPs) and special purpose vehicles (SPVs) set up for PPP arrangements, under which the government is the main purchaser of services for its own use or as an input to provide another service, or on behalf of final consumers. These explicit contingent liabilities of a government are commitments that are based on law and contracts, which primarily include explicit government guarantees and financial risk associated with direct government liabilities and explicit guarantees. The most obvious contingent liability of this kind is the explicit loan guarantees issued to state-owned energy firms. Country experience suggests that these explicit contingent liabilities can quickly and significantly raise the government's debt-to-GDP or deficit-to-GDP ratios, when unforeseen events occur. Another common source of contingent liability is on account of PPPs and off-budget entities. For instance, in Nigeria, the Lagos State Government has in the past issued a guarantee to debt services payable by the state utility concessions company. The most prevalent cases of subnational energy subsidies are typically for district heating.

Contingent liabilities are also a convenient political tool, since there is no immediate effect on the government's budget and they leave the eventualities of higher public debt and fiscal costs for the future. They are also used as a form of providing "hidden" state assistance in a country (for example, to a failing and inefficient state-owned energy firm).

Implicit liabilities of the government are commitments that are typically based on political announcements, public expectations, and possible interest group pressures in countries. They include primarily losses, non-guaranteed obligations, arrears, or deferred maintenance of autonomous or semi-autonomous SOEs in the energy sector. Since some of these entities are deemed critical for delivery of public services (such as affordable energy supply), a government may be expected by the public for moral or political reasons to eventually pay for these non-guaranteed debts, arrears, and deferred maintenance of some SOEs. For the same reason, losses, non-guaranteed debt, and arrears of off-budget liabilities and local governments are *implicit contingent* liabilities of the state government. These contingent liabilities can become the direct liabilities of the central government if some uncertain event is triggered where the original entity or debtor is unable to meet that payment obligation.

On the assets side, the different sources of potential revenues that can cover the government obligations are catalogued in the fiscal hedge matrix (see table 3; Polackova-Brixi and Mody 2002). These sources of financial safety are also either explicit or implicit, direct or contingent. Direct sources include sources that the government can

employ by its legal power to raise income from its existing or tangible assets. The direct implicit sources represent those sources that the government can draw on from its existing assets, but are not in their direct control at the time and will require a special circumstance to access. This latter source would then offset the governments' fiscal risks to a limited extent only.[6] Contingent explicit sources include measures that the government can legally use to raise revenues from sources other than its own assets. These can be reduced by subsidizing petroleum products, for example, through corporate income tax reductions to the producers and distributors of the petroleum products. While contingent implicit sources of financial security are typically not available to the government, unless some uncertain event occurs, even then these sources would require a special justification by the government to use them.

Once these two matrixes are filled with country-specific items, the government can identify the exact scope of the fiscal analysis and management of fiscal risks, including those emanating from the energy sector.

TABLE 2: The Fiscal Risks Matrix on the Liabilities Side

	Direct Liabilities	Contingent Liabilities
Explicit liabilities (Legal obligation no choice)	• Foreign and domestic sovereign debt • Budget expenditures—both in the current fiscal year and those legally binding over the long term (civil servant salaries and pensions)	• Guarantees for borrowing and obligations of sub-national governments and SOEs. • Guarantees for trade and exchange rate risks. • Guarantees for private investments (PPPs). • State insurance schemes (deposit insurance, private pension funds, crop insurance, flood insurance, war-risk insurance). • Unexpected compensation in legal cases related to disparate claims.
Implicit liabilties (Expectations—political decision)	• Future public pensions if not required by law • Social security schemes if not required by law • Future health care financing if not required by law • Future recurrent cost of public investments	• Defaults of sub-national governments and SOEs on nonguaranteed debt and other obligations. • Liability clean-up in entities being privatized. • Bank failures (support beyond state insurance). • Failures of nonguaranteed pension funds, or other social security funds. • Environmental recovery, natural disaster relief.

Note: These liabilities refer to fiscal authorities, not the central bank.
Source: Polackova-Brixi (1998).

TABLE 3: Fiscal Hedge Matrix: Assets and Contingent Financing

SOURCES of Financial Safety	**DIRECT** (based on the stock of existing assets)	**CONTINGENT** (dependent on future events, such as value generated in the future)

Explicit
Based on government legal powers, such as ownership, the right to raise taxes, and other revenues
	• Asset recovery (such as workouts, sales of nonperforming loans, state equity sales)
	• Proceeds from privatization of SOEs and other public resources
	• Recovery of government loan assets (for example, resulting from earlier direct government lending
		• Government revenues from natural resource extraction and sales
		• Government customs revenues
		• Tax revenues less
		  ▸ New tax expenditures to be introduced in the future
		  ▸ Revenues already earned from forward sales (such as commodity forward sales)
		  ▸ Costs of hedging instruments and re-insurance purchased by government to protect tax revenue

Implicit Based on government indirect control	• Stabilization and contingency funds* • Positive net worth of central bank	• Profits of SOEs • Contingent credit lines and financing commitments from international financial institutions. • Current account surpluses across currencies.

* Can be designed as general or specific-purpose funds under direct or indirect control of government.
Source: Polackova-Brixi and Schick (1998), p. 26.

6. FISCAL IMPACTS AND STATE-OWNED ENTERPRISES

Energy subsidy reforms are often carried out as part of broader energy sector reforms. Energy SOEs are often among the largest SOEs in many countries, and the SOE fiscal risk analysis should apply to the energy firms as well. To this end, one needs to look at SOE fiscal risks emanating from the energy firms. In addition, SOE restructuring will impose fiscal pressures—especially for loss-making SOEs and those with already large outstanding liabilities.

Sovereign guaranteed debt of state-owned energy entities and related SOEs is not all that one needs to monitor and manage from the fiscal risks perspective. One also needs to take into account other sources of fiscal risks from SOEs' operations, such as the operating losses expected, reported liabilities, deferred maintenance, and payment arrears by SOEs (for example, fuel cost owed by a state-owned utility to a state oil company). These total obligations need to be covered on top of any future losses. In addition, SOE liabilities may translate into explicit and implicit fiscal costs for the national or provincial governments, the latter particularly so in the case of district heating. In natural-resource-rich developing countries, SOEs often dominate the mining or hydrocarbon sector, and anything they do related to revenue and spending will most likely have macroeconomic implications. Oil production and the concentrated nature as well as the size of the government revenue it generates create demand for low-priced petroleum products from citizens in the form of consumer price subsidies. One needs to follow the transmission mechanisms of these sectors as they affect the macroeconomic situation of the country and its medium- to long-term growth prospects. This has implications for the design, speed, and success in implementation of a country's efforts to manage the macroeconomic vulnerabilities that it may be exposed to because of commodity price fluctuations and their effects on fiscal revenue, and its impact on inclusive growth over the medium to long term.

In a decentralized economy, the provincial and municipal governments may have to spend more on special retraining programs for displaced SOE workers and provincial social safety net commitments. The province's ability to generate plausible subnational revenues and expenditure projects are important for assessing and maintaining fiscal sustainability of these added fiscal costs. Investments in urban infrastructure and quality of life, reform of government-owned energy firms, and the associated social protection mechanisms will require the mobilization of substantial financial resources, for instance, by ending subsidies to loss-making locally administered public utilities and divesting SOE shares and assets or managing them more efficiently.

Wider and faster transformation of SOEs can place greater demands on social safety nets. Additional reforms to improve the fiscal sustainability and efficiency of key programs, including unemployment insurance or minimum subsistence payments in urban areas and pensions, need to be undertaken in countries.

Figure 5 illustrates the ways in which the state may be called upon to provide fiscal support to state-owned energy suppliers and other associated SOEs in a country. Figure

6 highlights the importance of examining balance sheets of the individual SOEs in order to design an appropriate fiscal risk management strategy. Just looking at the operating statements and cash flows will present only a partial picture.

Energy SOEs are exposed to both exchange rate and fuel price fluctuations, which make cost recovery fragile, especially in countries where there has been lack of progress on cost pass-through mechanisms. For hydrocarbon exporters, a significant part of energy subsidies may be carried on the balance sheets of upstream hydrocarbon producers, cross-subsidizing below-market provision of fuels downstream. SOE liabilities may translate into explicit and implicit fiscal costs for a national or subnational government.

FIGURE 5: Fiscal Risks from Explicit and Implicit Subsidies to Energy SOEs

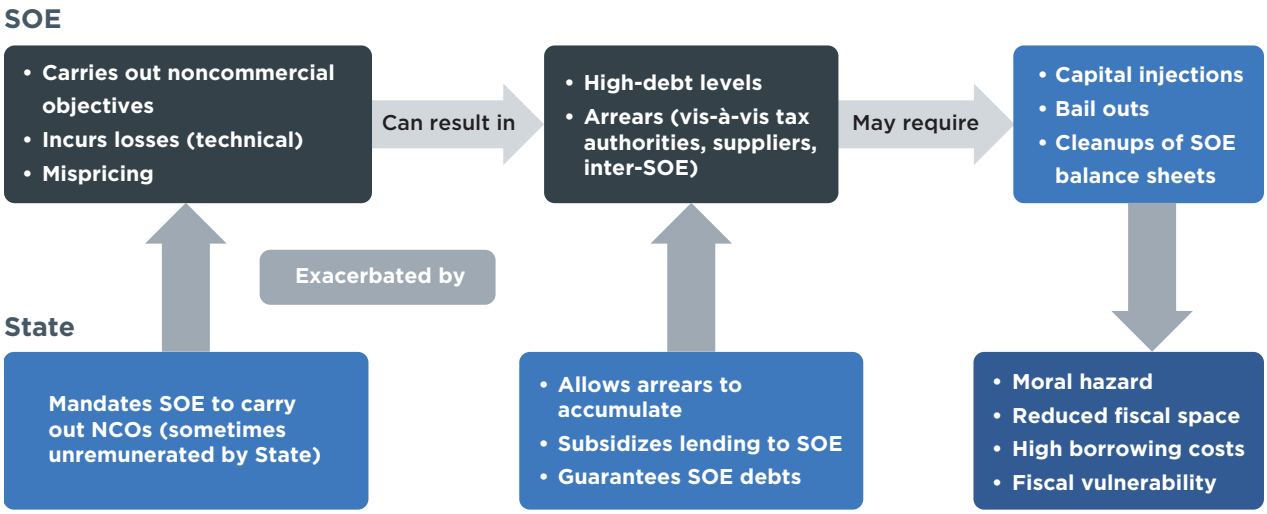


FIGURE 6: Fiscal Risk Matrix: How SOEs Can Contribute to Fiscal Impacts in Future

	Operating statement	Balance sheet	
	Revenues	Direct liabilities	Contingent liabilities
Direct	Tax payments Dividend flows		
Explicit obligations		• Direct subsidies and transfers, including to cover noncommercial obligations of SOEs • On-lent loans to SOEs	• Sovereign guarantees for SOE debt • Contracts (including PPPs) with guarantee clauses (e.g., securing loan repayments)
Implicit obligations		• Arrears owed to the State • Inter-enterprise arrears	• Default of unguaranteed SOE debt (bail outs, capital injections) • Cleanup of SOE liabilities, arrears

7. FISCAL RISKS FROM ENERGY SECTOR PUBLIC-PRIVATE PARTNERSHIPS

Energy SOEs may enter into PPPs in their investment and service delivery decisions (for example, through build-operate-transfer and/or concession agreements with private partners over a multiyear period), which have associated direct and contingent fiscal costs. Assessment of fiscal impacts from such arrangements requires combining sector-specific and economy-wide analyses of fiscal risks.

The PPP-Fiscal Risks Assessment Model (P-FRAM), developed by the IMF and the World Bank, is an analytical tool that can be used to assess the potential fiscal costs and risks arising from such PPP projects. In many countries, investment projects have been procured as PPPs not for efficiency reasons, but to circumvent budget constraints and postpone recording the fiscal costs of providing infrastructure services. Some governments have ended up procuring projects that either could not be funded within their budgetary envelope, or that exposed public finances to excessive fiscal risks. To address these concerns, P-FRAM has been developed as an analytical tool to quantify the fiscal implications of PPP projects. It is designed to be used mostly by PPP units in ministries of finance.

In practice, assessing a PPP project involves both gathering specific project information and making judgments about the government's role at critical stages of the project cycle. P-FRAM provides a structured process for gathering information for a PPP project in a simple, user-friendly, spreadsheet-based platform, following a four-step decision tree, as follows:

1 | ***Who initiates the project?*** The impact of main fiscal indicators (that is, deficit and debt) varies depending on the public entity ultimately responsible for the project (such as central, local governments, and SOEs).

2 | ***Who controls the asset?*** Simple, standardized questions assist the user in making an informed decision about the government's ability to control the asset. The funding structure of the project is what determines its implication on main fiscal aggregates. P-FRAM allows for three funding alternatives: (a) the government pays for the asset using public funds; (b) the government allows the private sector to collect fees directly from users of the asset (such as tolls); or (c) a combination of the two.

3 | ***Does the government provide additional support to the private partner?*** Governments can not only fund PPP projects directly, but they can also provide a variety of support to the private partner, including guarantees, equity injections, and tax amnesties.

4 | ***PPP fiscal risk matrix.*** Directed by a sequence of questions regarding project characteristics, P-FRAM identifies a set of possible explicit or implicit contingent liabilities, inviting the user to present information on the likelihood and impact of each risk, and on the mitigation measure in place. Once project-specific and macroeconomic data are entered, P-FRAM automatically generates standardized outcomes, which include (a) project cash

flows; (b) fiscal tables and charts, both on a cash and accrual basis; (c) debt sustainability analyses with and without the PPP project; and (d) sensitivity analysis of main fiscal aggregates to changes in macroeconomic and project-specific parameters. The P-FRAM "heat map" is generated by the model, which provides a visual depiction of the fiscal risks from the selected PPP projects, its likely fiscal impact, whether there is a contingency plan to address or mitigate it, and if it requires priority action by the authorities in that country at the time or could be addressed in the medium term.

Having catalogued sources of fiscal risks and looked at fiscal impacts of energy subsidies, SOE, and PPP fiscal risks using these analytical tools, the results can then be consolidated to see their overall impacts on fiscal sustainability under uncertainty. Box 3 provides a summary of this toolkit for fiscal risk assessments from contingent liabilities. This analysis can be conducted at national and subnational levels of government.

BOX 3: TOOLKIT FOR FISCAL RISK ASSESSMENT FROM CONTINGENT LIABILITIES

Fiscal Risks and Fiscal Hedge Matrix helps identify which fiscal risks are large, how their size can be affected so as to begin to design fiscal risk mitigation strategies and reform measures to minimize these risks.

Integrated Fiscal Framework, the subject of this ESRAF guidance note, helps quantify the fiscal resource envelope and plan the resource allocation among competing spending programs as and after energy subsidy reforms are implemented.

P-FRAM Model is applied to specific cases to identify cash flow and actuarial effects, as well as a "heat map" of various fiscal risks the project faces on the basis of these PPP contracts (at national and subnational levels).

Stochastic Fiscal Sustainability Assessment incorporates uncertainty into the standard DSA. It also looks at aggregation of fiscal risks in a probabilistic and endogenous analytical framework, and generates "fan charts" and cumulative probability distributions of key variables (such as debt-to-GDP ratio).

8. LESSONS: FISCAL IMPACT AND FISCAL RISK ASSESSMENTS

To appropriately assess the fiscal impact of energy subsidy reforms in a country, the following steps should be considered:

- Examine income and expense statements of energy SOEs and identify budgetary flows between government (national or subnational) and the SOEs.
- Identify all other sources of energy subsidies.
- Catalogue fiscal risks stemming from energy sector by constructing relevant "fiscal risks matrix" for government (to include sources, such as PPPs, sovereign guarantees, and off-budget or quasi-fiscal spending in sector).
- Develop reform scenarios based on relevant policy questions, potential sector reforms, and any potential investment plans (including through PPPs), and incorporate them into an integrated fiscal framework.
- Examine implications of energy subsidy removal scenarios on medium-term debt and fiscal sustainability indicators (deterministic DSA) and compare with an appropriate country debt sustainability thresholds as appropriate.
- For middle-income countries and countries with market access (and better data), undertake fiscal sustainability analysis under uncertainty in addition (that is, a stochastic DSA) as appropriate.

ENDNOTES

1 See Guidance Note 1 by Masami Kojima. It should be noted that the price-gap approach does not capture the full fiscal cost of energy subsidies. The price-gap approach may capture price support to consumers or producers, but fails to capture many other forms of subsidies that do not have a clearly identifiable effect on the prices being examined, such as underpricing of access to government-owned land, shifting of risk burdens from producers to consumers or the government, and below-market provision of loans.

2 Rentschler and Bazilian (2016) note that between 1980 and 2010, 36% of global carbon emissions were driven by fossil fuel subsidies. They cite another study by Schwanitz and others (2015), which found that reforming fossil fuel subsidies by 2020 could reduce global carbon emissions by 6.4% in 2050, and if 30% the savings were reinvested in renewables and energy efficiency, this would further take this reduction in carbon emissions to 18%.

3 These are Burkina Faso, China, the Arab Republic of Egypt, Ethiopia, Ghana, India, Morocco, New Zealand, Senegal, Sierra Leone, Singapore, United Arab Emirates, and Vietnam..

4 *Seigniorage* embodies the impact of monetary policy on debt build-up in a country. It is defined as the change in money supply as a share of GDP. (It can be estimated by the ratio of change in reserve money to gross domestic product).

5 This typically can supplement other fiscal risk assessment tools in the World Bank Group Toolkit, such as "The Fiscal Risks Matrix," the World Bank-IMF PFRAM, and PROST model for pensions, among others, to get a more holistic picture of the fiscal impacts of energy subsidies and their reform path.

6 Another contingent financing source for energy SOEs is the withholding of dividends by them to make up for losses, including subsidies.

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